

FERMILAB FRIENDS for SCIENCE EDUCATION





FERMILAB FRIENDS FOR SCIENCE EDUCATION

ANNUAL REPORT

2008



P.O. Box 500, MS 226 Batavia, IL 60510-5011

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FROM THE FERMILAB DIRECTOR



Piermaria Oddone, Director Fermi National Accelerator Laboratory

May 8, 2009

Dear Fermilab Friends for Science Education:

Thanks to your efforts, Fermilab has been able to create a remarkable K-12 science education program that has a lasting and positive impact in our neighboring communities and beyond. Without your support we could have never achieved the breadth and excellence that are the hallmarks of our program. It has been a model for other institutions and for our sponsoring agency, the U.S. Department of Energy. Over the last decade we have reached hundreds of thousands of students and tens of thousand of teachers—a fantastic record that benefits the nation.

Federal funding for education programs at institutions like ours has varied greatly across the years. It has been the constancy of the support for Fermilab Friends for Science Education that has anchored our science education program and has permitted us to design creative new ways to engage our youth in scientific inquiry. Recently we celebrated Marge Bardeen for her 25 years of service in the leadership of Fermilab Friends for Science Education. The tributes from the many people who have participated in the program—teachers, administrators, volunteers and students—revealed the passionate engagement that all of them shared with Marge as they developed all aspects of the program. As Marge steps down from her leadership position, the Lab is fortunate to have Susan Dahl in place to lead the organization into the future with her great devotion to the Laboratory's work in science education and her organizational skills.

This year we welcome a new administration in Washington with great hopes and expectations. President Obama has spoken eloquently about the important role of science and science education to the future of our country. We hope this leads to new and even more extraordinary science education initiatives at Fermilab. The support of Fermilab Friends for Science Education will be more important than ever in seeding these initiatives so that the next generation of young scientists may flourish.

mana adaro

Sincerely,



FROM THE FFSE PRESIDENT

In 2008 we celebrated the 25th anniversary of Fermilab Friends for Science Education (FFSE) and Marge Bardeen's incomparable accomplishments as our long-time president. Looking ahead we can expect a continuation of high standards, strong support and exceptional success in the partnership between FFSE and Fermilab. With this annual report, Fermilab Friends for Science Education begins an era of new and exciting challenges. I look forward to working with you.

During 2008 we experienced ups and downs. Economic difficulties hit Fermilab through rolling furloughs and some layoffs, and yet we recovered. Members individually may have experienced some of the same. We know the educator program scholarships, high school student awards and scholarships, and teacher recognition, through the FFSE Distinguished Educator Award, are all needed and appreciated all the more through this economic downturn. You, as FFSE members, make these scholarships and awards possible.

Science classrooms throughout the Chicagoland area appreciate science role models. Students and science teachers look forward to classroom visits such as the Light and Color presentation when students comment, "We loved learning about waves by using a slinky. We also loved to see the shirts turn color before our eyes. Thank you for giving us an awesome opportunity to learn about light and color." The purchase of an FFSE van makes classroom visits more convenient for our valued volunteers, our Fermilab engineers, scientists, graduate students and others. You support the classroom visits through your membership.

As families continue to look for enriching ways to keep their children engaged in learning about their world through science, FFSE has provided enrichment opportunities through the Fermilab Family Open House and the Family Outdoor Activity Fair, a part of the SPARKS program. Thousands of people enjoyed both events. We thank our anonymous donor and other organizations whose grants made these events possible through Fermilab Friends.

Whether you are a new teacher member, a long-time Fermilab member, or a community supporter, we need you to partner with us. Your continued support for scholarships, student and teacher awards, classroom presentations and public events has made a difference for hundreds of teachers and thousands of students in 2008.

Together we can make a truly significant impact in our community. Get to know us better. Get to know what you can do along with us. Join us.



Susan M. Dahl, President Fermilab Friends for Science Education





INTERVIEW WITH MARGE BARDEEN

Marge Bardeen recently stepped down from a long tenure as president of FFSE, but continues in her role as manager of Fermilab's Education Office. In this interview with annual report editor Anne Mary Teichert, she reflects on Friends' role in science education through the years.



Can you talk a little about how your perspective on science education has changed during the 25 years you've been at Fermilab?

When I began working at Fermilab, I taught in a middle school gifted and talented program. But I never really taught science, and I studied to teach math. When it comes to the role of the teacher and the role of the student in the classroom, I doubt those roles are subject dependent. I did have a philosophy of education, if you want to call it that. It was, and is, based on the notion that students learn best when they are engaged, and that teachers who engage their students in appropriate activities can effectively guide student-centered learning.

What has changed is my understanding of the opportunities that new technologies offer, of what recent brain research tells us about learners, and how best practices in teaching and learning and professional development impact our work. Technology has given us new ideas and new tools, and it's opened up completely new ways of teaching and learn-

ing. Think about what the Web, handheld computing devices and electronic data probes mean to science teachers.

Results in brain research suggest that teachers implement more student-centered practices. Having access to these ideas puts what one might call a naïve philosophy into a broader context and gives one the grounding to say, "That was a good philosophy I had in the first place."

Best practices in teaching and learning show up in the National Standards that guide the overall science curriculum. Best practices in professional development guide the way we design and run PD programs.

Do you see the role of educational non-profits changing during this time of economic hardship, and what unique role might Friends play?

Are things really so different? Friends has always responded to Fermilab Education Office requests; Fermilab programs respond to the needs and interests of educators, which aren't tied so closely to the economy. They are tied to the demands from federal and state governments, to local requirements, etc. In addition, the Education Office has been cushioned from the impact of the current downturn because we are part of the Lab infrastructure.

Friends has played a major role in developing programs; once a program is proven, the Education Office budget should sustain it. I don't see changes in that important role. The question may be, "What is the Education Office's capacity to generate new programs?" Our main limitation is the size of the staff. We are fully engaged in offering the current scale of programming; we can look at how to expand our reach, but I suspect new programs would have to replace older ones.

A story in the winter newsletter emphasized the strategy that Friends and the Education Office have used in promoting teacher leaders by involving them in every facet of program development. What struggles are teachers faced with, and how can Friends support them?

Most of what I hear teachers complaining about are district situations, often driven by government actions such as No Child Left Behind, and Friends has no control over that.

What Friends and Fermilab can do is to provide a breath of fresh air. Teachers can be in the prairie, rub

shoulders with scientists, do research, do what they love. We don't solve their problems, but we do give them a venue where they can grow and stretch in ways that they find exciting.

Can you talk a little about how Fermilab's education programs reach around the world through programs like QuarkNet and I2U2? And what role does Friends' support play in this?

Fermilab's Education Office is in a unique position to provide support for more than just the Lab because we have access to a critical mass of scientists. In some sense, what we can do for the HEP community is to provide educational infrastructure, bringing expertise in education to the table. We can also foster collaborations. By collaborating with physicists from other places, we can put together a program like QuarkNet, and with scientists from other disciplines, I2U2.

The role of Friends in national programs like QuarkNet is to leverage local funds for local teachers. Most programs expect leveraged funds and through Friends we have access to funds unavailable to FRA. In QuarkNet, Friends provided funds to purchase cosmic ray muon detectors for all of the Illinois teachers interested in having a classroom detector. Down the road, we could do the same thing with travel, for example.

Here is another example of how Friends could help: Bob Peterson wants to hold a cosmic ray "shower party" at Fermilab by getting a bunch of QuarkNet teachers and students together for a day. But the teachers would need buses; they would need to pay substitute teachers; they would need lunch; they would need scientists to spend time with the group. I imagine that Friends could find a donor to support that. For

\$5,000 we could do a lot. It's not a lot of money, but it's money that we don't have in the Education Office budget. So it's that ability to leverage other funds and bring resources together that makes Friends so valuable.

It's clear how teachers and students benefit from Friends' involvement in science education, but do you see benefits to the broader community at Fermilab, in particular, to the scientific community?

I think that scientists care about education for two main reasons: first of all, they want to replace themselves, so they have to invest in young people. Secondly, they love what they are doing and want to share the excitement of what they do with young people. I suppose you could also say that they get involved because they want to "do good."

Friends supports opportunities for them to do programs that they would like to do. Michael Albrow had the idea to reach 10,000 kids in their classrooms during the World Year of Physics. Friends bought the necessary equipment and later bought a van to transport it. Michael saw the challenge to expand what we were doing, and Friends let Michael fulfill his vision. Our program gives lots of young scientists a way to contribute as well, and it lets them work in a way that's effective.

You probably wouldn't have stuck with this job so long if you didn't enjoy it. What have you enjoyed most about your 25-year involvement with science education?

Of course, it's the people. Over the years I have had just great people to work with.

Also, there's a sense of accomplishment and satisfaction when you see an idea become a job well done. That job gets done because people work together. And so it does always come back to the people. Liz Quigg knows more about computers than I do, Chris Hill knows more about symmetry, Susan Dahl has more experience with libraries. George Zahrobsky, Lee Marek, Bob Grimm, Robin Dombeck, Pat Franzen and many, many more teachers know more about students and the classroom than I do. Why not bring them together to use their varied experience to build really great programs?

CONGRATULATIONS TO HONOREES!

DIRECTOR'S AWARD

In 2008, FFSE once again sponsored a reception and Director's Award to honor the more than 200 members of the Fermilab community who contributed their time and talents to Fermilab's education programs.

The award of \$1,000, made possible by an anonymous donor, recognizes one volunteer whose contributions are exceptional, even among the many outstanding volunteer supporters of Fermilab's K-12 education programs.

This year's finalists were **Peter Garbincius**, for his contributions to the Ask-A-Scientist program, and **Suzanne Weber**, for her contributions to Saturday Morning Physics. Each finalist received a certificate recognizing his or her contributions.

The 2008 Director's Award went to **Jean Slaughter**. Her citation reads, "Fermi National Accelerator Laboratory recognizes the exceptional and varied contributions of Jean Slaughter to our K–12 programs. Outstanding among her efforts is her work with classroom presentations.

As a presenter, recruiter, and trainer, she helps to reach thousands of students each year. She also mentors high school teachers involved in research physics at the highest level through the Fermilab/University of Chicago QuarkNet Center. Her dedication to these and other programs and her generosity with her time have enhanced the Laboratory's reputation in both education and science research."

HIGH SCHOOL STUDENT AWARDS

Every year FFSE underwrites an award program for outstanding science students attending high schools in DuPage and Kane Counties. Nominated by school faculty, each winner receives a certificate and a book at their school's award ceremony. This year's winners were:

Terry O'Connor, Caroline Neville, Geneva High School; Kristin Nordquist, Glenbard North High School; Durga Thakral, Michael Wurtz, Glenbard South High School; Elizabeth Hoffman, Elizabeth Bleed, Glenbard West High School; Yuan (Ryan) Li, Thomas Hutchinson, Hinsdale Central High School; Arathi Jayareman, Deepa Romadurai, Hinsdale South High School; Joshua Fenton, Laura Hildebrand, Immaculate Conception High School; John Rot, Bradley Thompson, Larkin High

School; Nicole Phelps, Maureen Getty, Lisle Senior High School; Ryan Finley, Christopher Senese, Montini Catholic High School; Kevin Pettit, Evan Thayer, Naperville Central High School; Neha Jayaram, Sameera Rahman, Neuqua Valley High School; Allegra Skurka, Laura Zborowski, Rosary High School; Matthew Miller, Piotr Tekiela, South Elgin High School; Diane Walters, Andrea Pavella, St. Charles East High School; Agnes Taylor, Christopher Montgomery, St. Charles North High School; Amy Feehan, John Purdom, Jr., St. Francis High School; David Skaggs, Daniel Chase, West Aurora High School; James S. Ribe, Wheaton Academy; Meredith Chase, Brian Schlick, Wheaton North High School; Elisabeth Lato, William Parkin, Wheaton Warrenville South High School; Maja Stojiljkovic, Radu Lazar, York Community High School.

FRANKLIN AWARD AND SCHOLARSHIP

In 2008, FFSE once again partnered with the Franklin Fund to offer a \$1,000 scholarship for one college-bound student in each of Kane and DuPage Counties.

The scholarship is an effort to encourage and support student interest in science and to recognize outstanding achievement. Any senior in Kane or DuPage County who has been honored with the Fermilab Science Award is eligible. Selection criteria include grades; participation in activities such as science clubs, academic competitions or talent searches; original work, and

internships.

In 2008, there was one finalist from Kane County, **Anna Scott** from Aurora Central Catholic High School. She received her medallion and award from Paul DesCoteaux of the Franklin Fund at her school's honors assembly on May 13.

There were three finalists from DuPage County high schools. **Durga Thakral** of Glenbard South High School received the award from Marge Bardeen at her school's honors assembly on May 14.

DISTINGUISHED EDUCATOR AWARD

Vida Goldstein of St. Mary's School in West Chicago was this year's recipient of the Distinguished Educator Award, funded by FFSE. The award is for teachers who engage students in science, provide leadership for the profession and are associated with Fermilab's K-12 education programs.

Vida received the award for "her exceptional contributions to

science education through her participation in *Beauty and Charm* and *Particles and Prairies*."

Her citation noted that, "Students are active learners in Vida's class. She values the importance of students exploring, discovering, and determining explanations on their own."

SCHOLARSHIP WINNERS

In 2008, four teachers received FFSE-funded scholarships that allowed them to attend workshops or field trips at Fermilab, and four families received Science Adventure scholarships. The recipients were:

Antonio and Lupe Calderon: \$50 toward Family Science Adventures; Alisa McIntosh: \$225 toward Particles and Prairies; Ursula

Ritter: \$325 toward Particles and Prairies; Juanita Rivas: \$50 toward Family Science Adventures; Jeff Stumpf: \$150 toward Introduction to Modern Physics; Melquiades and Maria Suarez: \$50 toward Family Science Adventures; Jillian Treacy: \$215 toward Particles and Prairies; Nancy Williams: \$100 toward Family Science Adventures.

PROGRAM HIGHLIGHTS

January

On January 27, FFSE sponsored the 4th annual Family Open House. It drew nearly 3,000 visitors, the largest crowd in its four-year history.

February

The Education Office hosted the Global Warming Summit, a high-level professional development day for secondary science teachers in Chicago's western suburbs. More than 500 teachers heard four scientists talk about issues related to climate change.

Forty-six teachers from Naperville Community Unit School District 203 attending an *I Wonder* teacher conference sorted, classified and studied insects from the Fermilab prairie under guidance from Lederman Science Center docents.

On February 20, the Education Office hosted the first STEM (Science, Technology, Engineering and Math) Career Expo for Kane and DuPage County high school students. STEM professionals representing 35 careers and 10 colleges and universities met informally with students. Several panels of engineers and scientists discussed aspects of their careers and education. Approximately 450 students and parents, and more than 65 volunteers attended the event.

March

On March 30, Weird Science presented the 21st annual Wonders of Science show, which sold out for the fifth consecutive year.

At a lunch at Chez Leon, FFSE honored Rod Walton, named an Outstanding Mentor by the Department of Energy for his work with the Pre-Service Teacher program.

April

FFSE received a grant of \$10,000 from the Concord Consortium to facilitate a review of the compatability of ARISE instructional materials with Concord Consortium resources.

The first Family Outdoor Activity Fair, held on April 27, drew 300 participants, who swept for insects, looked through microscopes, searched for fossils, visited with hawk handlers, and engaged in a prairie scavenger hunt.

May

During 2008, the Lederman Science Center hosted 2,710 students from 41 schools, who participated in *Beauty and Charm* and *Phriendly Physics* field trips.

June

Thirty-eight teachers took part in Summer Secondary Institutes in Physics, Chemistry and Biology. Thirty-one teachers attended workshops for *The Prairie - Our Heartland* and *Particles and Prairies* programs.

During 2008, 1,459 scouts from 106 troops earned sciencerelated badges through 59 programs at the Lederman Science Center.

July

Science Adventures engaged 407 children in grades K-8 during the year. The 35 classes included *Lego Engineering, Girls Scientific Salon, Noodlin' with Newton, It's a Bug's Life, Survival Science, Club Invention, Spring Bike Safari,* and *Junior Prairie Rangers*.

August

Sixty-three people attended prairie tours before the *Wilderness Plots* concert, held on the Lederman Science Center lawn.

In August, 443 casual visitors explored the Lederman Science Center.

Forty-two Girl Scouts earned badges in six summer scout programs.

September

Fermilab's first Junior Prairie Rangers earned stewardship certificates by learning about the biodiversity of the prairie and collecting seeds at the Fermilab seed harvest.

Scientists, Education Office staff and docents represented Fermilab at LabFest, the opening event of Science Chicago, a year-long celebration of science in the greater Chicagoland area.

October

On October 8, Fermilab hosted the sixth Symposium on the Nature of Science, drawing 426 teachers and students from 17 schools.

During the fall, 4,890 students from 44 schools attended *The Prairie—Our Heartland* and *Particles and Prairies* field trips at the Lederman Science Center.

November

Docents gave 550 Sigma Pi Sigma Congress participants tours of Wilson Hall, the Linac and other Fermilab sites on November 7.

At the annual volunteer reception, sponsored by FFSE, Fermilab Director Pier Oddone presented the Director's Award to Jean Slaughter for her extensive volunteer work for the Education Office over the years. Peter Garbincius and Suzanne Weber were finalists for the award. The reception honored the more than 200 volunteers who interacted with nearly 30,000 students and 2,000 teachers during 2008.

December

Scientists and Fermilab volunteers visited nearly 14,000 students in 2008 as part of the ongoing classroom visitation program.



Friends' shiny new cargo van carried volunteers to LabFest on its maiden voyage in September, and facilitated classroom visitations throughout the fall semester.

PERSONNEL

The success of the 2008 FFSE programs rests with these outstanding program leaders.

Michael Albrow, Fermilab • Michael Bachrodt, Fremd High School, Palatine • Leo Bellantoni, Fermilab Richard Billings, Montini Catholic High School, Lombard • Georgia Brown, Northern Illinois University Sue-Z Bruno, Gates Elementary School, Aurora • Jill Burke, Berwyn School District 100 • John Chamberlain, Glenbard North High School, Carol Stream • Alex Chen, Fermilab • Jennifer Ciaccio, West Chicago High School, West Chicago • Penelope Constanta, Fermilab • Michael Cooke, Fermilab Trudi Coutts, Naperville Community Unit School District 203, Naperville • James D. Cox, Clarendon Hills Middle School, Clarendon Hills • Laura Cox, Glenbard South High School, Glen Ellyn • Karl Craddock, Fremd High School, Palatine • Larry Cwik, teacher, retired • Robin Dombeck, Maple Middle School, Northbrook • Jason English, Fremd High School, Palatine • Amy Fehrman, Johnson Elementary School, Warrenville • Patricia M. Franzen, Wild Enterprises, Metamora • Ford Garberson, Fermilab • Lynn Garren, Fermilab • Vanessa Gaultney, Fermilab • David Harding, Fermilab • Elvin Harms, Fermilab • Anne Heavey, Fermilab • Amber Johnson, Fermilab • David Johnson, Fermilab • Randy Jones, Glen Ellyn School District 41, Glen Ellyn • Samantha Kaushalya Hewamanage, Fermilab • Steve Keefe, teacher, retired • Nikki Kitzmiller, Rotolo Middle School, Batavia • Tom Knutson, Glenbard North High School, teacher, retired, Carol Stream • Leon Lederman, Fermilab • Robert Lewis, Downers Grove North High School, Downers Grove • Lucy Litvinenko, Fermilab • Paul Madsen, Rosary High School, Aurora • Lee R. Marek, University of Illinois, Chicago • Chris Marszalek, Twin Groves Junior High School, Buffalo Grove George McGuire, Hinsdale South High School, Hinsdale • Stephen Meehan, Naperville Community Unit School District 203, Naperville • Tom Meyer, Fermilab • Jill Mueller, West Chicago Middle School, West Chicago • Dennis Nicklaus, Fermilab • Paul Nienaber, Fermilab • Mary Sue Offut, SciTech and Field Museum volunteer, Aurora • Glenda Peck, Alice Gustafson Elementary School, Batavia • Pat Pentek, West Chicago Middle School, West Chicago • Michelle Prewitt, Fermilab • Chris Quigg, Fermilab • Tom Redig, Downers Grove North High School, Downers Grove • David Ritchie, Fermilab • Barbara A. Romack, Kaneville North Elementary School, Elburn • Brittany Rutherford, Fermilab • Niki Saoulidou, Fermilab • T. J. Sarlina, Fermilab • Dave Schmitz, Fermilab • Valena Sibley, Fermilab • Jean Slaughter, Fermilab • Michael Syphers, Fermilab • Linda Valerio, Fermilab • Jeremy Werner, Fermilab • Chris White, Fermilab • Herman White, Fermilab • Wayne R. Wittenberg, Glen Ellyn School District 41, Glen Ellyn • Jim Zagel, Fermilab • Jerry K. Zimmerman, Fermilab • Anna Zuccarini, Crone Middle School, Naperville

Education Office staff administers and supports the program leaders.

Marjorie G. Bardeen, Manager • Carol Angarola, Administrative Support Assistant • Susan M. Dahl, Education Specialist • LaMargo A. Gill, Editor • David Hoppert, Laboratory Technician • Nancy Lanning, Public Information Specialist • Waylon Meadors, Computer Specialist • Laura A. Mengel, Computer Specialist • Spencer L. Pasero, Education Specialist • Robert Peterson, Education Specialist • Elizabeth K. Quigg, Computer Specialist • Gayle Millman, Administrative Support Assistant • Sue Sheehan, Education Specialist • Andrea Varry, Administrative Support Assistant

Docents facilitate student field trips and other Education Office activities and supervise the Lederman Science Center.

Lynda A. Ballingall • Karen Bass • Donna Blankenship • Mary Campbell • Lisanne Canal • Susan Dumford Mary Hawthorne • Maureen Hix • H. Ted Hoesel • Helen D. Huie • Jacqueline J. Krock • Dawn Miller Wendy G. Mouche • Mary Jo Murphy • Gail Poisson • David R. Seymour • Bob Shaw • Mary Ann Stowell Felicia Svoboda • Anne Mary Teichert • Yvonne Twomey • William Welch • Larry Welsh • Dorothy Yurs



REVENUES AND EXPENSES

	2007 (audited)	2008 (audited)	26 years (1982-2008)
Revenue/Contributions (\$000)			
Public Agencies	\$ 2.1	\$ 0.0	\$4,235.3
Private Foundations	112.7	91.6	915.8
Membership	21.9	17.7	354.8
Other	6.3	14.4	409.5
Total Revenue/Contributions	\$ 143.1	\$ 123.7	\$5,915.5
Expenses			
Programs	\$ 79.6	\$ 112.1	\$4,306.0
Administrative Overhead	30.2	48.7	1,477.3
Total Expenses	\$ 109.8	\$ 160.8	5,783.3
Excess (deficit) of Revenue/Contributions	¢ 22.4	¢ (27.1)	¢ 122.2
over Expenses	\$ 33.4	\$ (37.1)	\$ 132.3

ACKNOWLEDGEMENTS

Fermilab Friends for Science Education depends entirely on contributions and grants. We thank the Fermilab Friends for Science Education members, Tree of Knowledge contributors, and the following organizations for their generous support of Fermilab education programs:

United States Department of Energy
Fermi Research Alliance, LLC
Wildlife Conservation Society
The Bronx Zoo
National Science Foundation
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STEM CAREER EXPO

CONNECTING STUDENTS WITH THEIR FUTURES



Science panelists Mike Lindgren, Stephen Moshier, Rosie Newsome and Marty Phalen.



Fermilab ecologist Rod Walton with a student.

On February 20, Fermilab hosted its first STEM (Science, Technology, Engineering and Mathematics) Career Expo for high school students.

The expo connected Kane and DuPage county students with scientists, engineers, technicians and mathematicians who volunteered their time to speak informally and to participate in panel discussions about their careers and educational backgrounds.

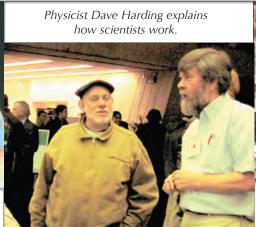
More than 450 students and parents, professionals representing 35 careers, and representatives from 10 colleges attended the event. The fourteen Fermilab scientists who participated reported a steady stream of students asking probing questions about scientific research and career opportunities.

Sponsored by FFFS, along with the Northern Kane County Regional Vocation System, the DuPage Area Occupational Education System and the Valley Education for Employment System, event organizers included Fermilab Education Office staff and educators from Kane and DuPage counties.

The event was very well received and the Education Office plans to hold more career expos in the future.



Engineering panelists Cynthia Pedersen, Jim Zagel, Anne Lucietto, Bunnyray Larmond and Linda Valerio.





Computer security specialist Tim Rupp reveals the pleasure of foiling hackers.